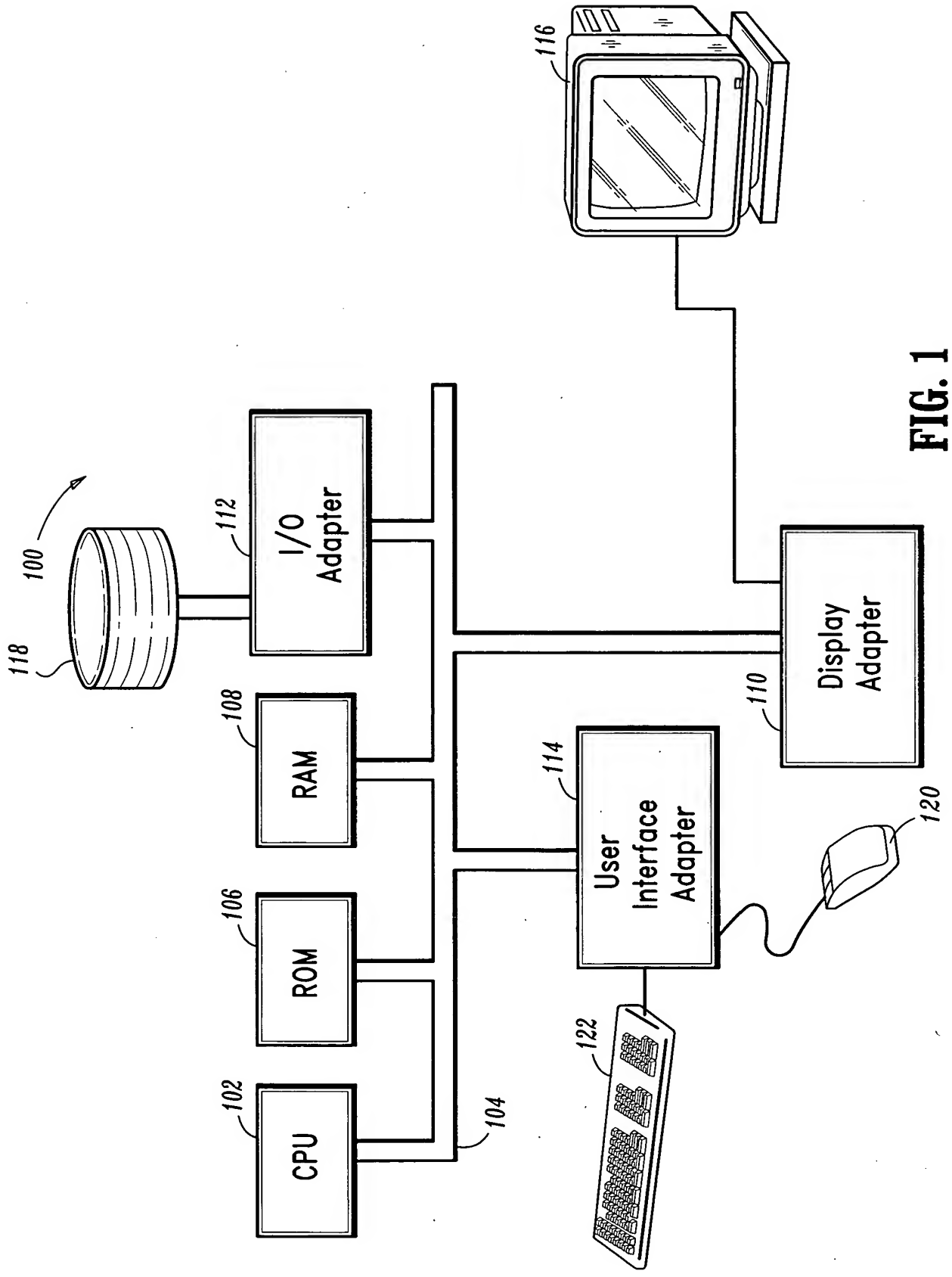

FIG. 1

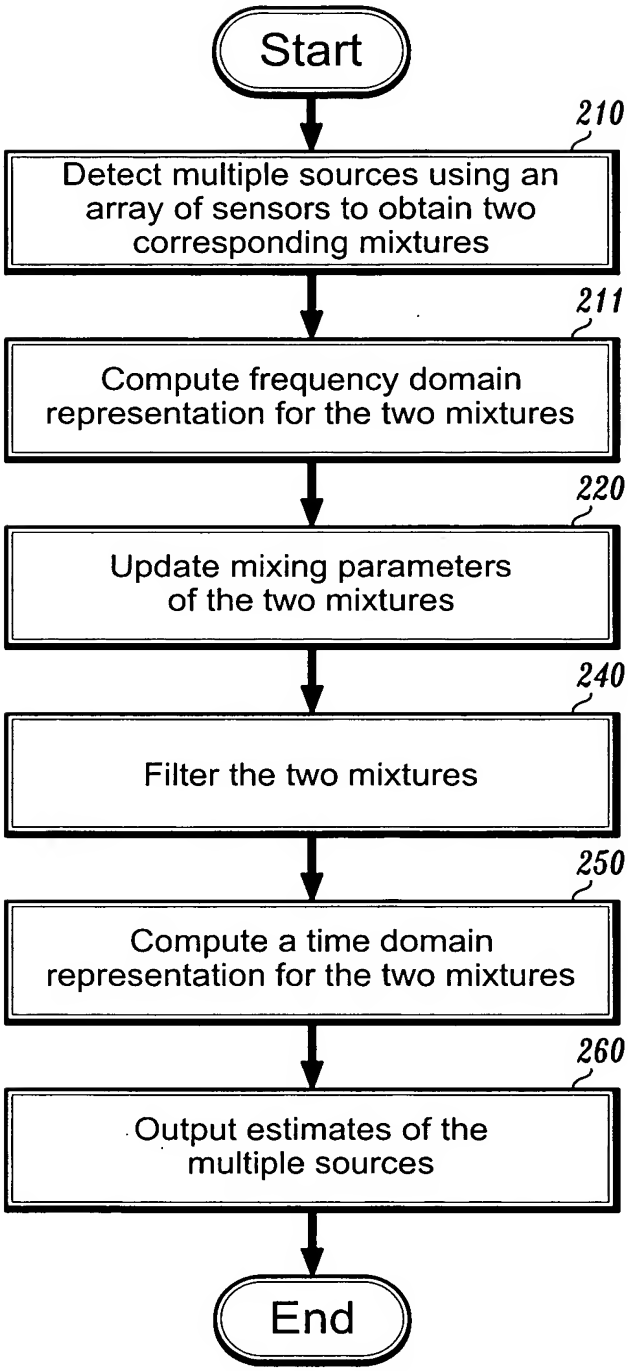
Start
210
Detect multiple sources using an array of sensors to obtain two corresponding mixtures
211
Compute frequency domain representation for the two mixtures
220
Update mixing parameters of the two mixtures
240
Filter the two mixtures
250
Compute a time domain representation for the two mixtures
260
Output estimates of the multiple sources
End

FIG. 2

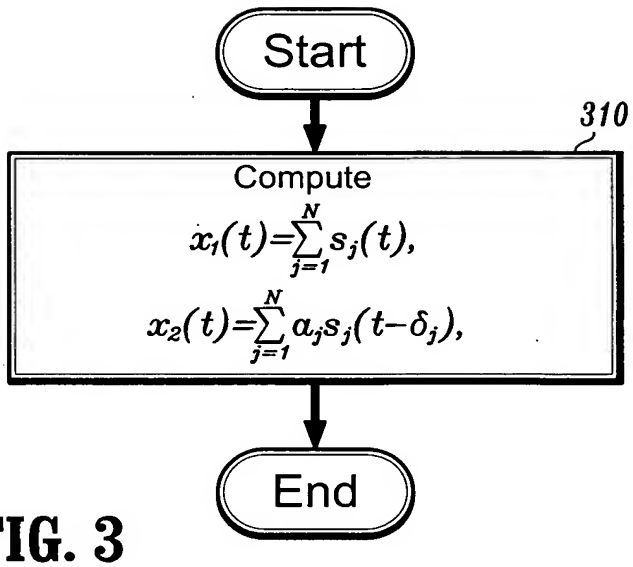

FIG. 3

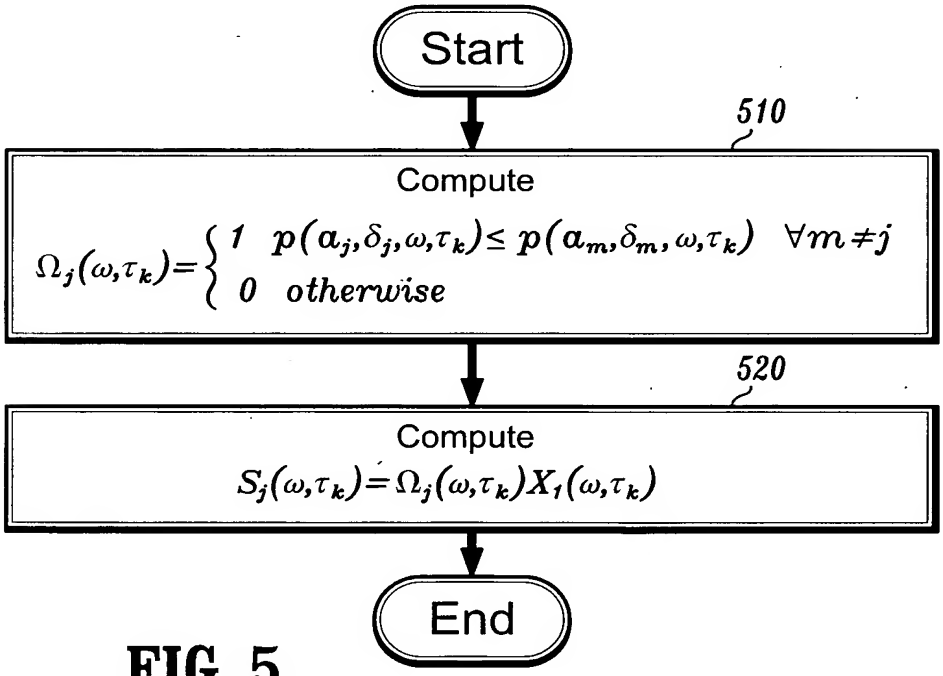

FIG. 5

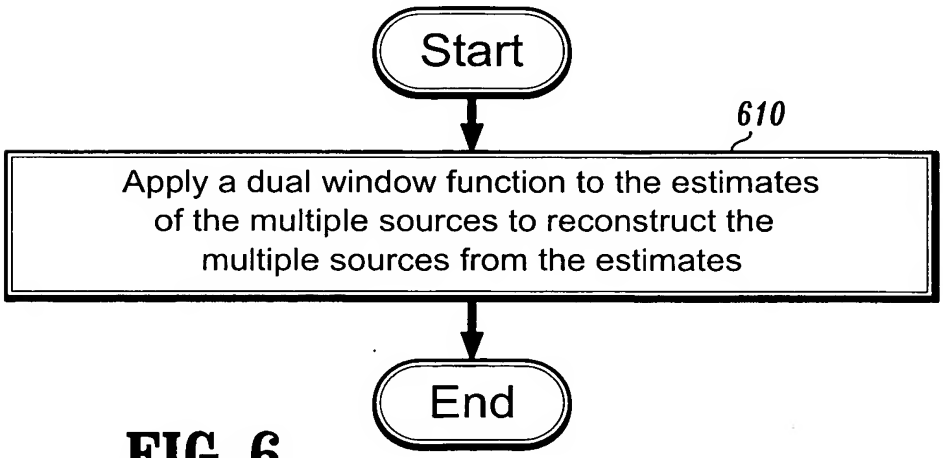

FIG. 6

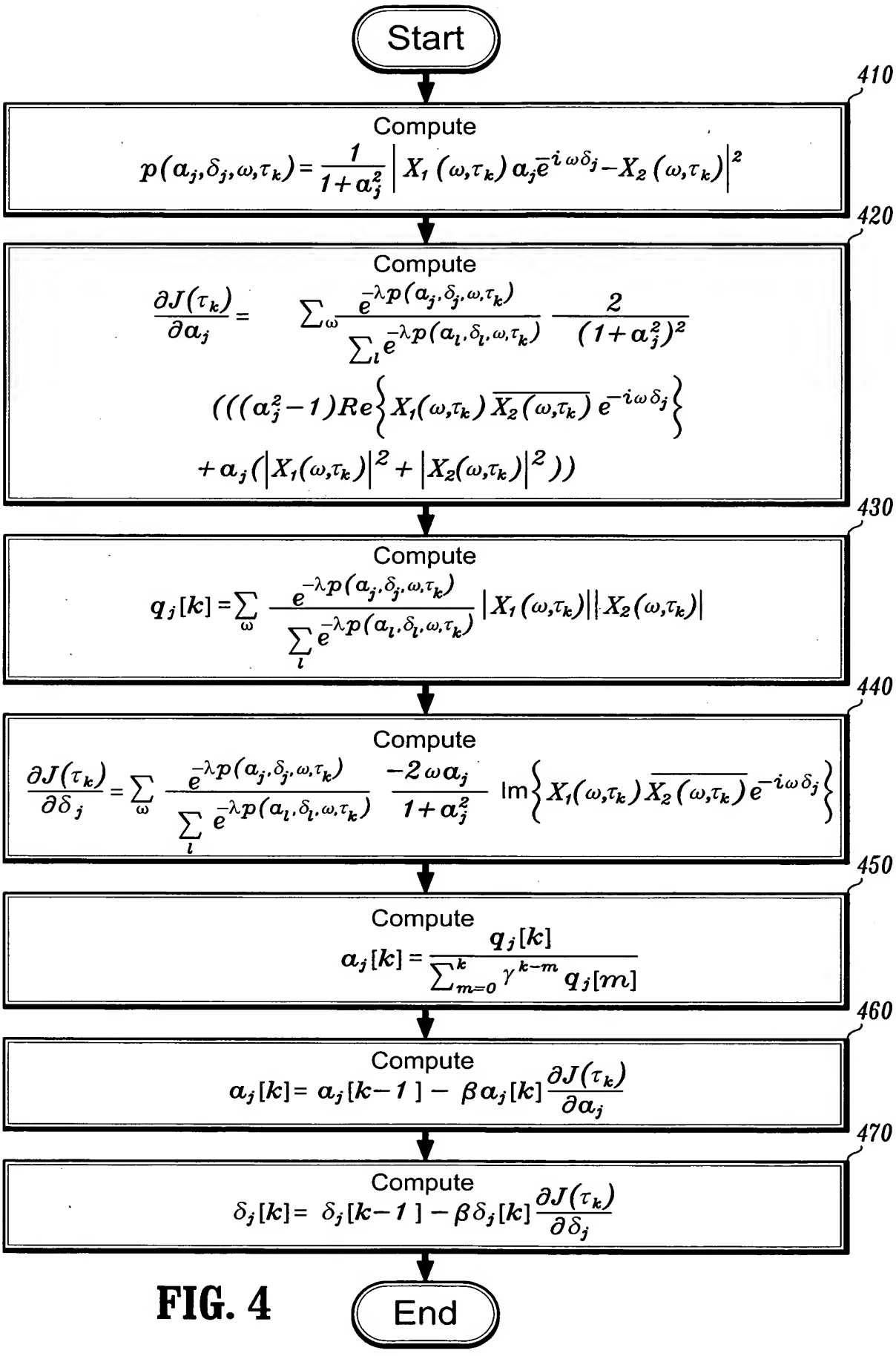
Start
410
Compute
$p(a_j,\delta_j,\omega,\tau_k)=\frac{1}{1+a_j^2}\left|X_1(\omega,\tau_k)\,a_j e^{i\omega\delta_j}-X_2(\omega,\tau_k)\right|^2$
420
Compute
$\frac{\partial J(\tau_k)}{\partial a_j}=\sum_\omega \frac{e^{-\lambda p(a_j,\delta_j,\omega,\tau_k)}}{\sum_l e^{-\lambda p(a_l,\delta_l,\omega,\tau_k)}}\frac{2}{(1+a_j^2)^2}$
$(((a_j^2-1)Re\{X_1(\omega,\tau_k)\overline{X_2(\omega,\tau_k)}\,e^{-i\omega\delta_j}\}$
$+a_j(|X_1(\omega,\tau_k)|^2+|X_2(\omega,\tau_k)|^2))$
430
Compute
$q_j[k]=\sum_\omega \frac{e^{-\lambda p(a_j,\delta_j,\omega,\tau_k)}}{\sum_l e^{-\lambda p(a_l,\delta_l,\omega,\tau_k)}}|X_1(\omega,\tau_k)||X_2(\omega,\tau_k)|$
440
Compute
$\frac{\partial J(\tau_k)}{\partial \delta_j}=\sum_\omega \frac{e^{-\lambda p(a_j,\delta_j,\omega,\tau_k)}}{\sum_l e^{-\lambda p(a_l,\delta_l,\omega,\tau_k)}}\frac{-2\omega a_j}{1+a_j^2}\,\mathrm{Im}\{X_1(\omega,\tau_k)\overline{X_2(\omega,\tau_k)}\,e^{-i\omega\delta_j}\}$
450
Compute
$a_j[k]=\frac{q_j[k]}{\sum_{m=0}^{k}\gamma^{k-m}q_j[m]}$
460
Compute
$a_j[k]=a_j[k-1]-\beta a_j[k]\frac{\partial J(\tau_k)}{\partial a_j}$
470
Compute
$\delta_j[k]=\delta_j[k-1]-\beta\delta_j[k]\frac{\partial J(\tau_k)}{\partial \delta_j}$
End

FIG. 4

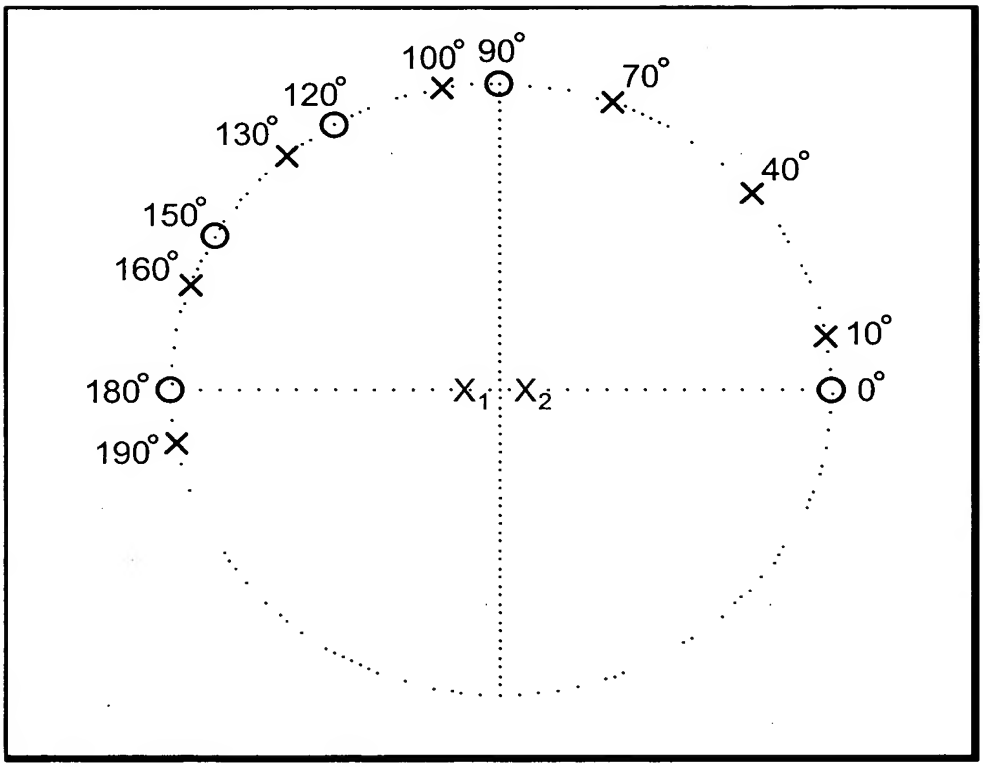

FIG. 7

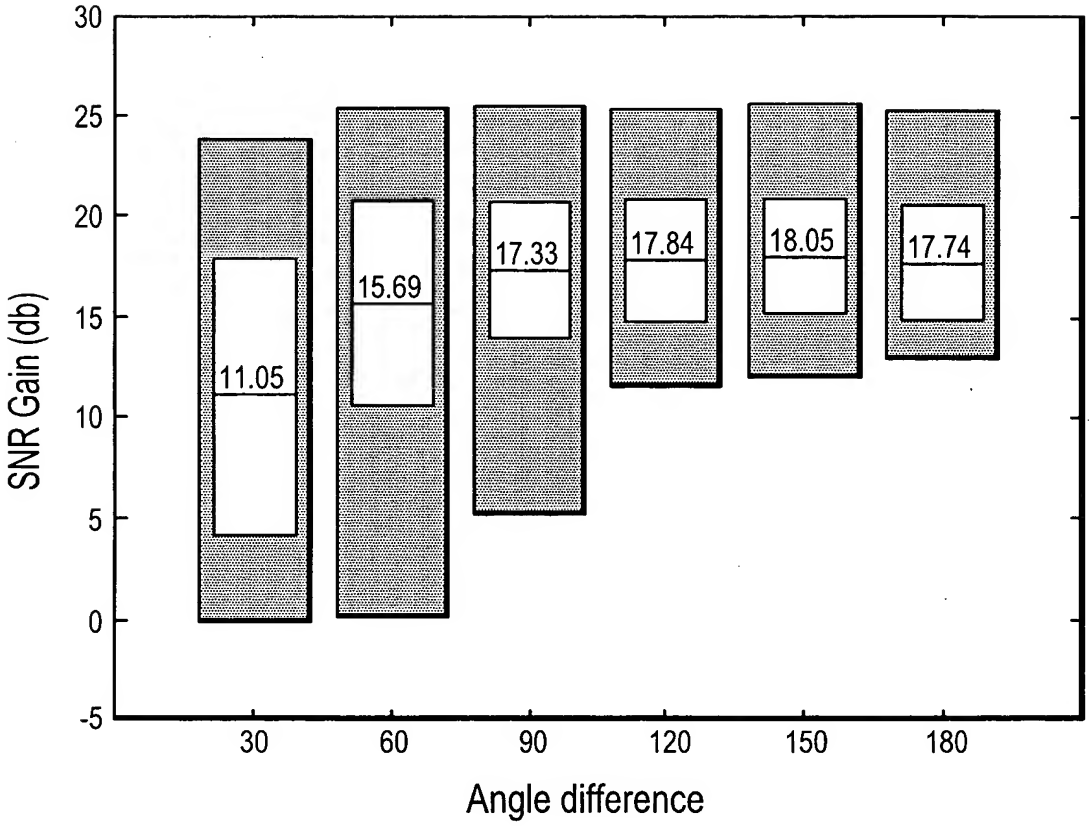
30
25
20
15
10
5
0
-5
SNR Gain (db)
11.05
15.69
17.33
17.84
18.05
17.74
30
60
90
120
150
180
Angle difference

FIG. 8

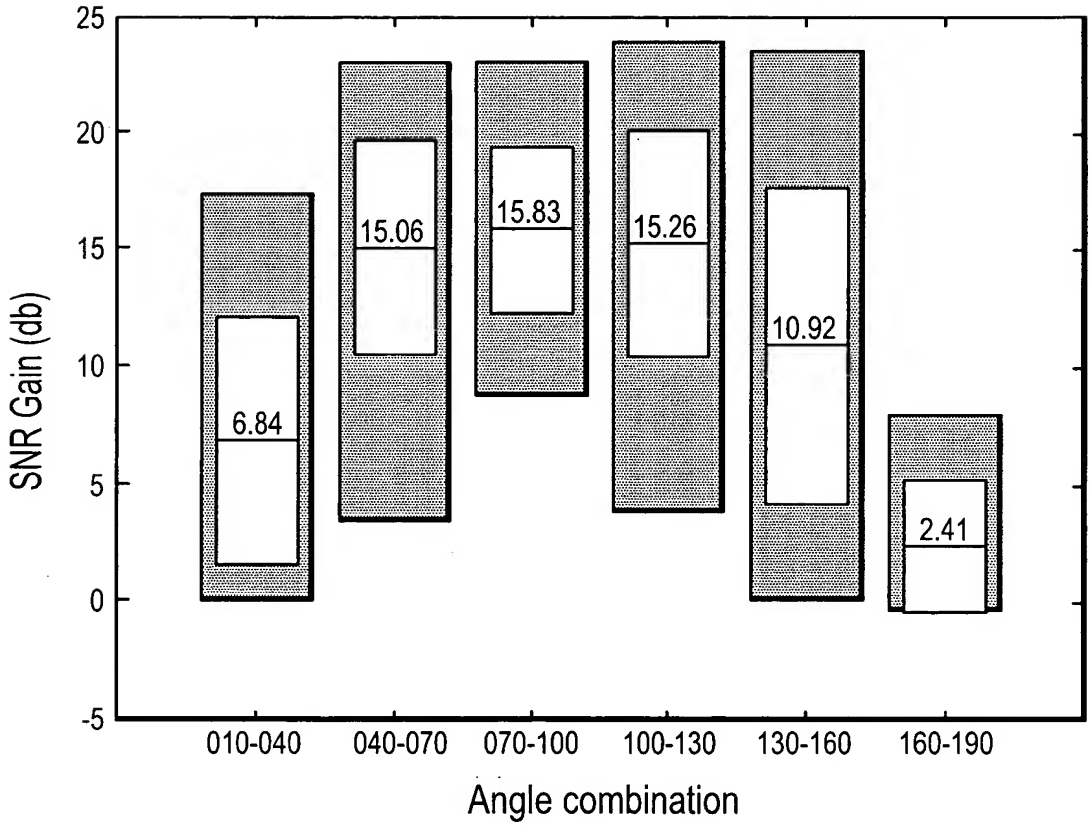
25
20
15
10
5
0
-5
SNR Gain (db)
6.84
15.06
15.83
15.26
10.92
2.41
010-040
040-070
070-100
100-130
130-160
160-190
Angle combination

FIG. 9

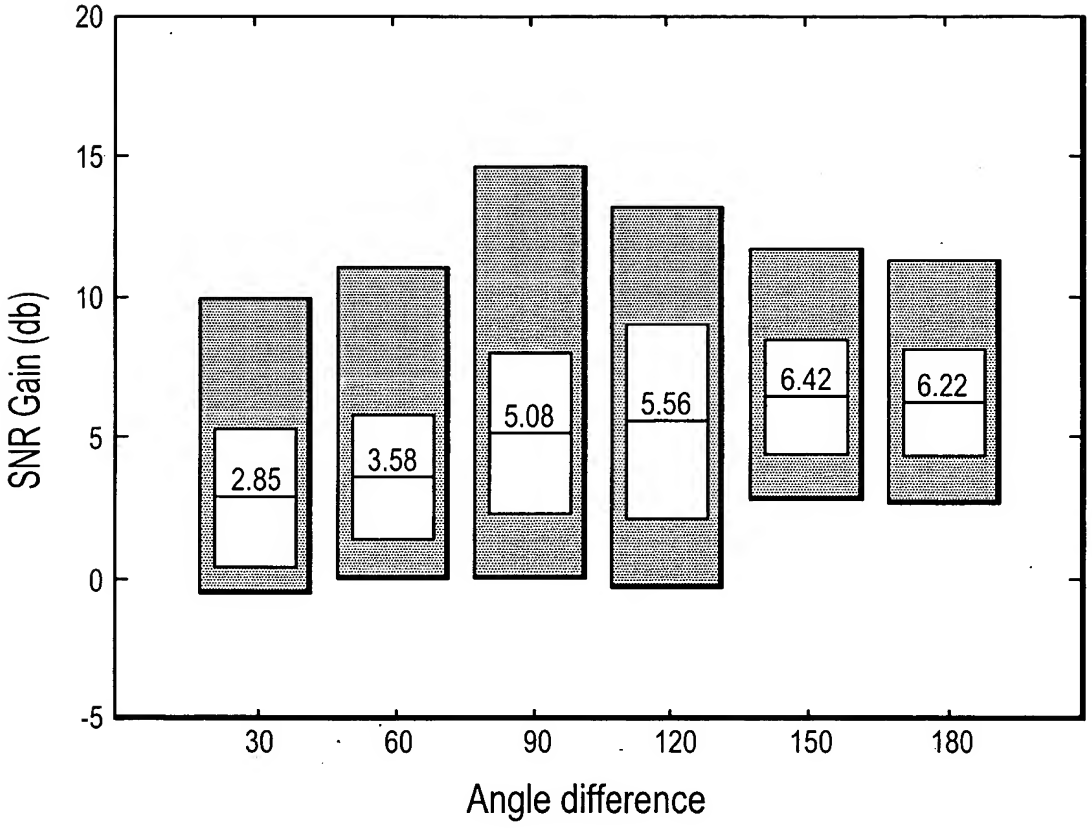
20
15
10
5
0
-5
SNR Gain (db)
2.85
3.58
5.08
5.56
6.42
6.22
30
60
90
120
150
180
Angle difference

FIG. 10

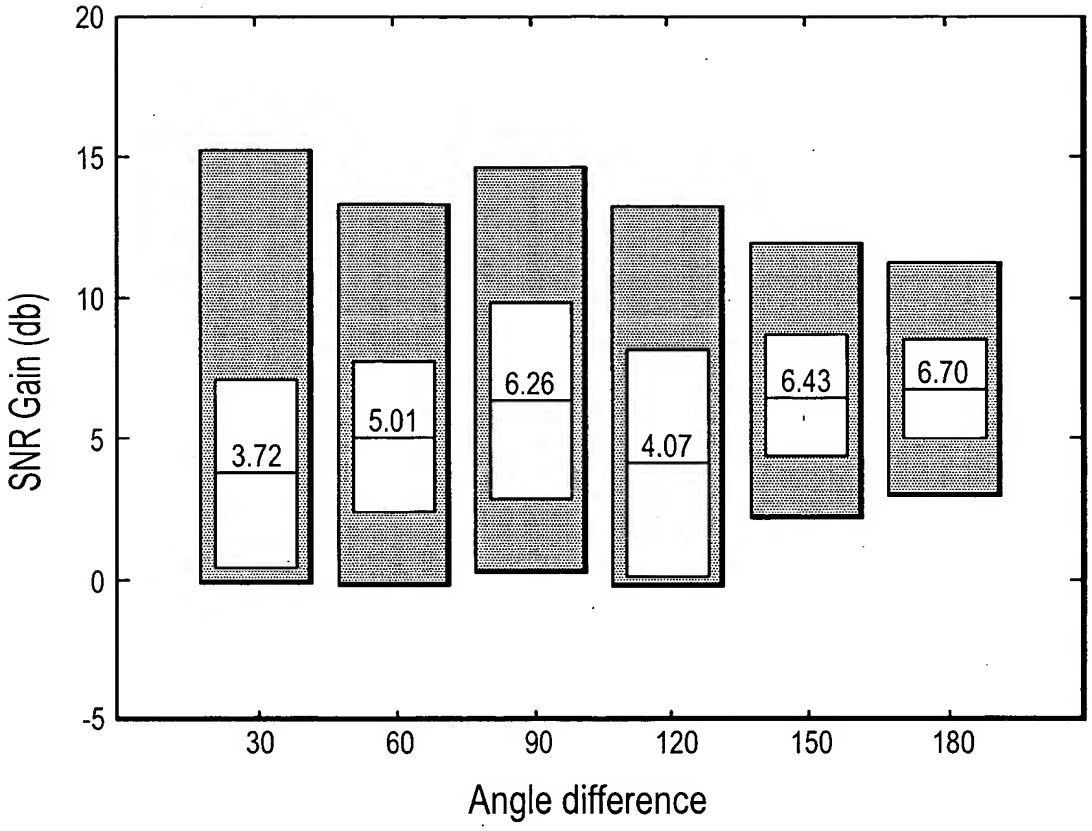
20
15
10
5
0
-5
SNR Gain (db)
3.72
5.01
6.26
4.07
6.43
6.70
30
60
90
120
150
180
Angle difference

FIG. 11

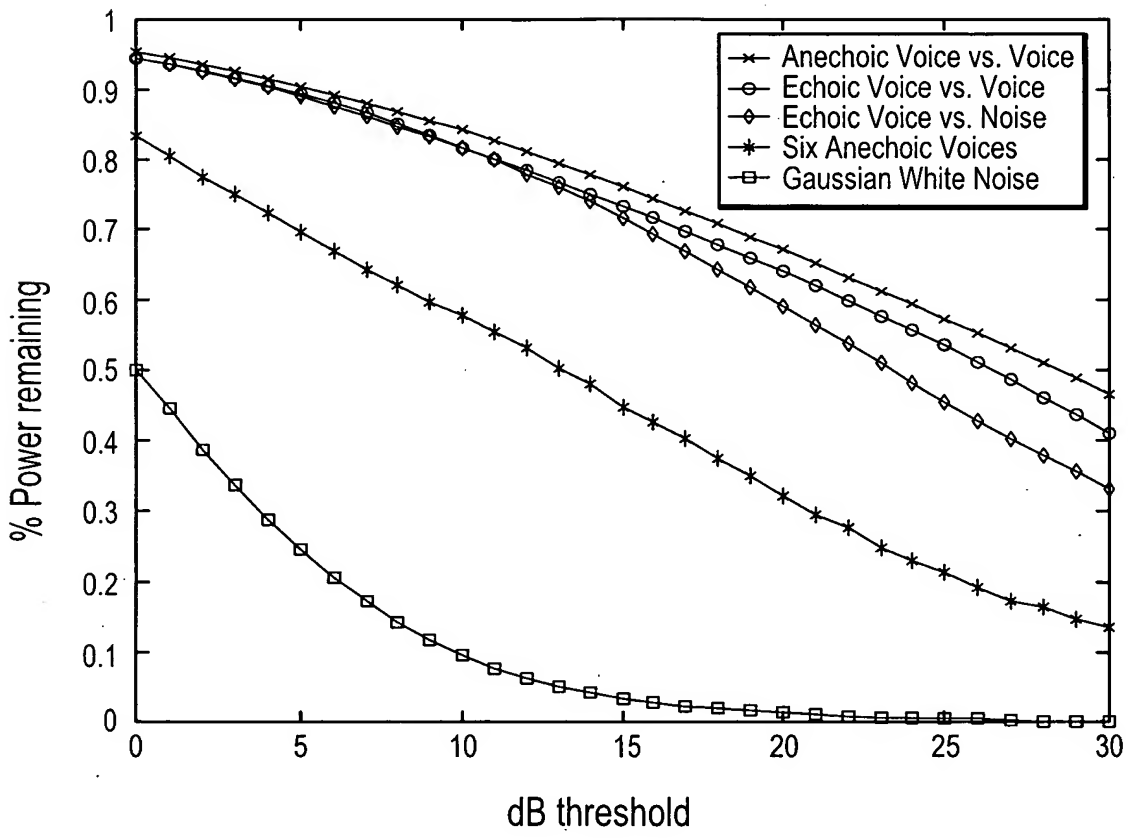
Anechoic Voice vs. Voice
Echoic Voice vs. Voice
Echoic Voice vs. Noise
Six Anechoic Voices
Gaussian White Noise
% Power remaining
dB threshold
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
5
10
15
20
25
30

FIG. 12